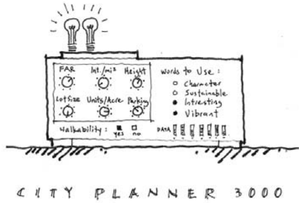
BEYOND METRICS

Master's Project Report

Paul Knight

DESIGNING THE MASTER STREET PLAN



Paul Knight

Beyond Metrics: Designing the Master Street Plan

Master's Project
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Spring 2010

School of Architecture
Georgia Institute of Technology

THESIS

Our current system of development regulations attempts to mechanize the design process by molding the complexities of urbanism into simple and naive ratios. This regulatory machine acts only on the parcel and fails to accommodate for the city. As an alternative I will propose a principle-based system of design for the generation of a master street plan that will lead to a more sustainable and holistic form of urbanism.

METHODOLOGY

Cities like Philadelphia, Savannah, and Chicago have consistently been regarded as some of the paragons of American urbanism. It is easy to appreciate these cities as works of both art and science. The logical subdivision of land, the continuous and sustainable street patterns, the inclusion of nature (parks) into the urban realm, and the inherent physical hierarchy linking one public institution to another are some of the components considered by their designers. Designers such as William Penn, James Oglethorpe, and Daniel Burnham are often remembered for their work beyond urbanism, but through their embodied energy consolidated into their urban designs they continue to have the most profound impact on us through the streets we walk today.

These planners of America's celebrated cities used the greatest examples of land subdivision patterns that the world had to offer—from the perfect and efficient geometries of the orthogonal grid, to military operations of the Spanish colonies, to Haussman's Paris. The methodologies these planners employed for their establishments were broad in scope and holistic in vision. Nothing was merely replicated or blindly drawn; rather, the level of contemplation and theory contained in their designs represented the highest level of intellectualism that could be applied to civilizations' most prominent and important artifact: its physical patterns of development.

Fast-forward to the present. Visions of development no longer include forethought of the future; rather, planners are locked in a constant "present" trying to catch their zoning codes up to the market. The physical layout of our streets and properties are no longer established; rather, they are merely approved. And the structure and framework of our cities are no longer occupied within our minds; rather, they live in thick tomes of international standards.

This strict consideration of the parts with a blind eye to the whole is largely responsible for the decline of the planning profession both in terms of the professionals as well as the products. By narrowing educational focus of professionals—Traffic Engineers, Storm Water Management Professionals, and Industrial Zoning Professionals instead of generalist City Planners—and agglomerating design guidelines into segregated zones, our cities are being ill-formed from the inside out. It is impossible to successfully design a whole through the isolated regulations of its parts.

MASTER STREET PLAN

Our current development laws are missing the first and most critical step toward successful urban design and city planning: the pre-established physical framework of our towns and cities, or the Master Street Plan. Without the establishment of a master street plan, any and all attempts at urban design and city planning—be it through zoning, zoning overlays, New Urbanism, Character Areas, transfer of development rights, etc—will inevitably fail to fulfill the goal of a truly comprehensive, holistic, and sustainable city plan. The conceptual framework that successful city development requires cannot be found in various individual metrics. The master street plan must be present in order to tie all regulatory metrics together and to keep them from acting destructively and autonomously.

The master street plan is not an overlay onto zoning; rather, it is a complete reversal to our current development system. Currently, "zones of use" come first which in effect determine the geometry of a city's infrastructure. In this scenario, when a grocery store, for example, goes out of the business or simply changes its location the city is left with a building shell on a site that can only accommodate another grocery, a bowling alley, an antiques market, or other similarly large and unique uses. In order to reoccupy the land one of three things must happen: 1) a developer inhabits the parcel with a similar use, 2) a developer must reconfigure the parcel's infrastructure to accommodate a different use adding considerable cost to the project, or 3) the parcel simply remains vacant. All too often the latter case is found to be the answer while new developments continue to march into the hinterlands of the city; thus, the perpetuation of sprawl.

The pre-establishment of a master street plan, on the other hand, puts the geometry of infrastructure first and zones of use second. In this scenario of reversed roles, if and when the grocery store leaves, the infrastructure does not have to be fully reconfigured and is already apt to take on any use—from small residential to large commercial.

The master street plan says nothing about how a city should look, how it should function, or how it should feel. It is merely an indexical framework of the land. This index allows for action at a distance. For example, a suburban house built 5 miles from the city center will immediately fit within the greater physical framework of the area even if the full extent of the framework will not be physically realized for hundreds of years. As development continues out (and it will), the infrastructure need not change. Thus, the master street plan is a medium for the sustainable transfer of land uses over time allowing for the location of our infrastructure, utilities, and largest public space to remain constant. The master street plan has no potential energy unto itself; rather, it requires our outside influence to realize its potential—just like the United States Constitution. Because the Constitution does not say everything we have an established court system of professional lawyers who interpret the Constitution. Because of this built-in "meta-Constitution", flexibility is readily observed as the same document that has allowed for slavery has also disallowed for slavery. The same text allowed for women's suffrage and disallowed for women's suffrage. Likewise, the master street plan requires this same level of professionalism and interpretation.

MECHANICAL METRICS AND MINDFUL MANIPULATIONS

As planning departments are beginning again to realize the importance of the design of our street networks, how does one actually design a master street plan? Current attempts to do so are often relegated to the impartial world of metrics. Metrics such as Connectivity Index, Street Centerline Density, and Intersection Density, among others, attempt to reduce all the complexities of urbanism into simple and naïve ratios. Their declarations of hard numbers and fast rules assume their own assertions. Based on specific instances or averages of unknown studies and precedents, metrics reach for universality. They attempt to distill the lessons of the Average into the average project, but simple averages can be deceiving. For example, Albert Einstein and Mickey Mantle together had a lifetime batting average of 0.149. The average tells me nothing of Einstein's genius or of Mantle's athletic skill. All was lost in the number.

Metrics are by their very nature inflexible. A metric's own exclusion of context will cause it to ultimately fail to accommodate for every situation at every time. Attempted malleability can be built-in to a metric's rules by establishing a larger numerical range, but doing so will eventually cause the device to lose its "metricness" and become nothing more than a vast extent of integers within which to pick from an infinity of possibilities, thus controlling nothing. Again we see the need for a meta-metric.

If metrics are to be avoided what about establishing statements of desired outcomes or principles? For example, this one taken from the Partial Update of the Comprehensive Development Plan for Conyers, Georgia:

"The traditional character of the community should be maintained through preserving and revitalizing historic areas of the community."

Or this one taken from the Charter of the New Urbanism:

"Streets and squares should be safe, comfortable, and interesting to the pedestrian. Properly configured, they encourage walking and enable neighbors to know each other and protect their communities."

On the immediate surface these statements seem analogous to the compromises one finds in the typographics of the Constitution: targeted enough to warrant absolute direction but flexible enough to be interpreted. Both of these statements declare an intent— "if you adhere to this sentence good results will follow"—but the problem with them is that they lack in asserting anything at all and ultimately render neither "means" nor "ends." Their complete inability to filter out any possibilities whatsoever renders them utterly and embarrassingly ineffective. There is no directional order to these statements, there is only a universe of interpretation: What is "traditional character?" Who defines it? Where does "character" begin and end? What makes a street "safe?" Or "comfortable?" Or "interesting?"
For the Charter, the statements are referred to as "principles," but this is flatly a misappropriation of, or at least a weak interpretation of, such a powerful word; a word that has imbibed into it much more meaning and purposefulness than is being utilized here. These same "principles" are found in the exact same zoning ordinances that the Charter despises, and yet the typographic mechanics of both systems are identical.

Contrary to these "principles," true Principles merge the concepts found in both metrics (measurability and tangibility) and proclamations (desirability). A Principle elucidates what is being seen or what wants to be seen. Principles of urban design are neither strong enough to act autonomously nor weak enough to be disregarded. They try to be specific, but not too specific. Indefinable and qualitative terms elude any occupation within typographic machinery and instead have to be managed and manipulated by mind alone. Principles do, however, require the cognitive power inherent in the minds of professionals in order to operate. The hierarchical and recursive process that occurs between the lower-level entity "Principle" and the upper-level entity "Brain" describes the design system necessary for the creation of a master street plan.

PRINCIPILES

Principles of Design were established for the purpose of testing their effectiveness on the creation of a master street plan for Conyers, Georgia. The Principles used for this project were:

Principle 1: Block Dimensions
A block should have sides with lengths greater than 240 feet and less than 600 feet and should have a perimeter less than 2,000 feet. These dimensions create the physical permeability necessary for a sustainable, efficient, and vibrant urbanism to materialize.

Principle 2: Block Geometry
Blocks should have an orthogonal geometry to insure both the efficient accommodation of multiple land uses over time and the parallel placement of buildings along the block's edge.

Principle 3: Exterior Street Connections
Street connections along the edge of the Master Street Plan should link directly with streets immediately outside of its boundary or should create T-intersections with minimum distances from existing intersections as specified by local code.

Principle 4: Axial Lines and Views
Utilize axial lines to highlight important spaces and institutions, to close vistas, and to create a unique sense of enclosure.

Principle 5: Public Institutions
Public institutions should occupy the most prominent, visible, and integrated parcels within the Master Street Plan. Avoid clustering these institutions into internally-oriented complexes Instead, allow them to anchor axial lines, reinforce parks, front major streets, and form a network of public buildings throughout the plan.

Principle 6: Park System
A system of parks should be situated throughout the Plan in order to protect any existing sources of water and to insure adequate spaces of recreation. Parks can also be used to articulate important institu¬tions, buildings, or monuments.

Principle 7: Topography
The local topography of a site should be preserved to the greatest extent possible but not to the detriment of the Master Street Plan. Since the subdivision of land through public infrastructure can have the longest lasting impression on a city, streets should be considered primary over topography within reason.

Principle 8: Water
Streams and sources of water should be protected and accessible by public rights-of-way on all sides. Common "backyard-buffer" conditions should be avoided when possible. Where a stream would have a negative impact on the sustainability of the Street Plan it should be piped, rerouted, or in¬corporated into the street section in or¬der to avoid such conflict.

Principle 9: Property Ownership
The design of a Master Street Plan within a context of existing development should attempt to be as least invasive as possible even if this means not producing the "best" Plan. This can be done by sequentially working through each of the following design steps until an appropriate plan has been generated.
1 : Keep existing streets.
2 : Reconfigure publicly owned land.
3 : Designate reserved rights-of-way across undeveloped land.
4 : Designate reserved rights-of-way along property lines.
5 : Designate reserved rights-of-way across parcels.

Principle 10: Autonomous Systems
Autonomous systems such as railroads, rivers, and interstate high¬ways operate outside of the stipulations of local conditions. These systems should be traversed by local public rights-of-way as fre¬quently as possible.

MEANS

Every municipality, including Conyers, Georgia, has the legal authority to describe, adopt, empower, and follow a master street plan. Such power is described in the Standard City Planning Enabling Act of 1928. The act, intended to function as the primary vehicle for all future development of America's municipalities, was overwhelmed by its own subordinate: the Standard State Zoning Enabling Act. The stipulations within the Zoning Act concerning the "master plan" were conflated with those within the Enabling Act concerning the "master street plan." But given our benefit of history and hindsight, we have the opportunity to correct those mistakes made before us and to follow the original and true intentions of urban design as described in the Enabling Act. The master street plan, therefore, needs to assume its proper role at the forefront of development. This project seeks to describe and illustrate the benefits associated with the adoption of a master street plan.

Bibliography

Amar, Akhil Reed. *America's Constitution: A Biography* (New York: Random House, 2005).

Bacon, Edmund N. *Design of Cities* (New York: Penguin Books, 1976).

Bartholomew, Harland. "What is Comprehensive Zoning?," *National Conference on City Planning* (1928).

, Edward M. *The Master Pan, with a Discussion of the Theory of Community Land Planning Legislation* (New York: Russell Sage Foundation, 1938).

—. *Recent New York Legislation for the Planning of Unbuilt Areas* (New York: Regional Plan of New York and Its Environs, 1926).

Bassett, Edward M. and Frank B. Williams. "The Preservation of the Integrity of the City Plan," *National Municipal Review* (March 1925).

Ben-Joseph, Eran. *The Code of the City: Standards and the Hidden Language of Place Making* (Cambridge: MIT Press, 2005).

City of Conyers, Georgia. "Partial Update of the Comprehensive Plan." (2008).

Congress for the New Urbanism. "Charter of the New Urbanism." Congress for the New Urbanism, http://www.cnu.org/charter [accessed April 13, 2010].

DPZ & Co., *SmartCode* Version 9.2 (New Urban News Publications, 2009)

Dunham-Jones, Ellen and June Williamson. *Retrofitting Suburbia: Urban Design Solutions for Redesigning Suburbs* (Hoboken, New Jersey: John Wiley & Sons, 2009).

Franzen, Torkel. *Godel's Theorem: An Incomplete Guide to Its Use and Abuse* (Wellesley, Massachusetts: A K Peters, 2005).

Gamble, Michael and W. Jude LeBlanc. "Incremental Urbanism: The Auto and Pedestrian Reconsidered in Greyfield Reclamation," *Places* (2004).

Godel, Kurt. *On Formally Undecidable Propositions of Principia Mathematica and Related Systems.* (New York: Dover Publications, 1992).

Haar, Charles M. "In Accordance with a Comprehensive Plan," [...] (1955).

Hardin, Garrett. "Tragedy of the Commons," *Science* (December 1968).

Hillier, Bill. *Space is the Machine, electronic edition* (www.spacesyntax.com: Space Syntax, 2007).

Hillier, B., A. Leaman, P. Stansall, and M. Bedford. "Space Syntax," *Environment and Planning B*(August 1976).

Hillier, Bill and Julienne Hanson. *The Social Logic of Space* (Cambridge: Cambridge University Press, 1984).

Hofstadter, Douglas R. *Godel, Escher, Bach: an Eternal Golden Braid* (New York: Basic Books, 1990).

—. *Fluid Concepts and Creative Analogies: Computer Models of the Fundamental Mechanisms of Thought* (New York: Basic Books, 1995).

—. *I Am a Strange Loop* (New York: Basic Books, 2008).

—. *Metamagical Themas: Questing for the Essence of Mind and Pattern* (New York: Basic Books, 1985).

Jackson, John Brinckerhoff. *Discovering the Vernacular Landscape.* (New Haven: Yale University Press, 1984).

—. *Landscape in Sight: Looking at America*, ed. Helen Lefkowitz Horowitz (New Haven: Yale University Press, 1997).

Jacobs, Jane. *The Death and Life of Great American Cities* (New York: Vintage Books, 1992).

Knack, Ruth and Israel Stollman. "The Real Story Behind the Standard Planning and Zoning Acts of the 1920s," *Land Use Law* (February 1996).

Kostof, Spiro. *The City Shaped: Urban Patterns and Meanings Through History* (New York, NY: Bulfinch Press, 1991).

Marshall, Stephen. *Streets & Patterns* (New York: Spon Press, 2005).

Nagel, Ernest and James R. Newman. *Godel's Proof* (New York: New York University Press, 2001).

van Nest Black, Rusell. *Building Lines and Future Streets: Their Establishment and Protection* (Cambridge: Harvard University Press, 1935).

Nichols, Philip. "Protecting the City Plan—the Next Steps," *Massachusetts Federation of Planning Boards* (November 1924).

Reps, John W. *The Making of Urban America* (Princeton, New Jersey: Princeton University Press, 1965).

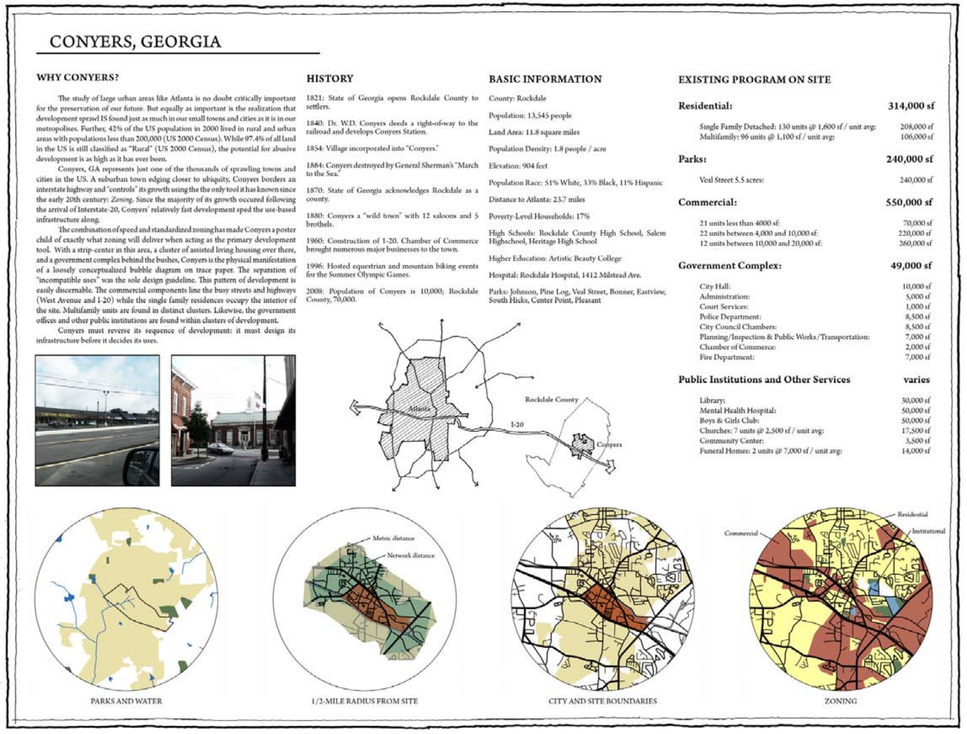
Secretary Hoover's Advisory Committee on Zoning. *A Standard City Planning Enabling Act* (Washington: Department of Commerce, 1925).

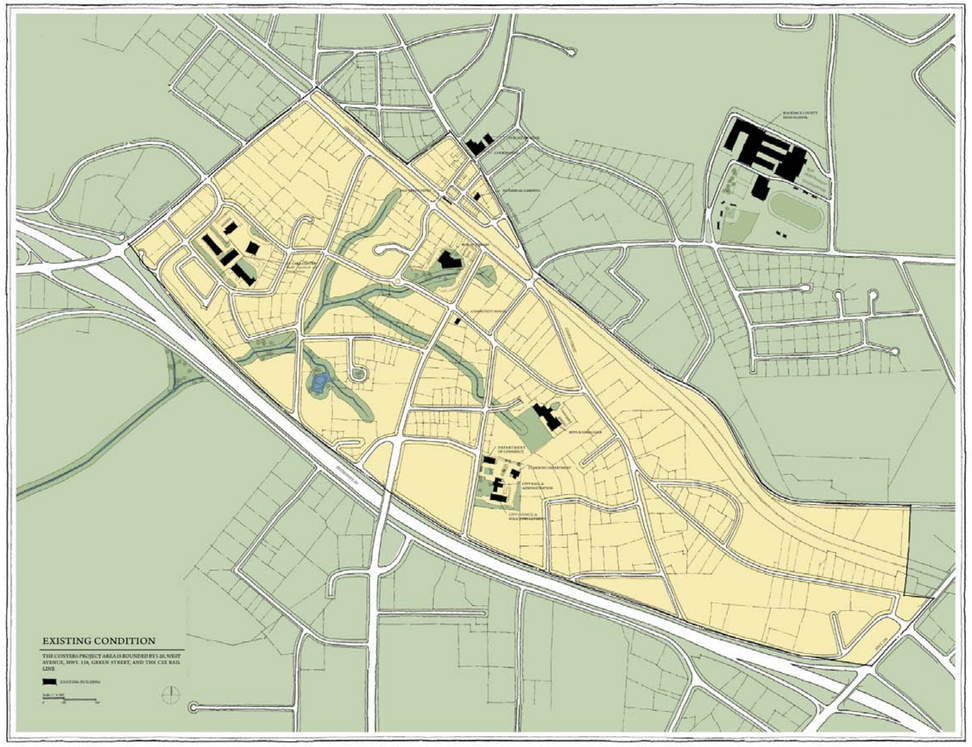
—. *A Standard State Zoning Enabling Act* (Washington: Department of Commerce, 1926).

—. *A City Planning Primer* (Washington: Department of Commerce, 1928).

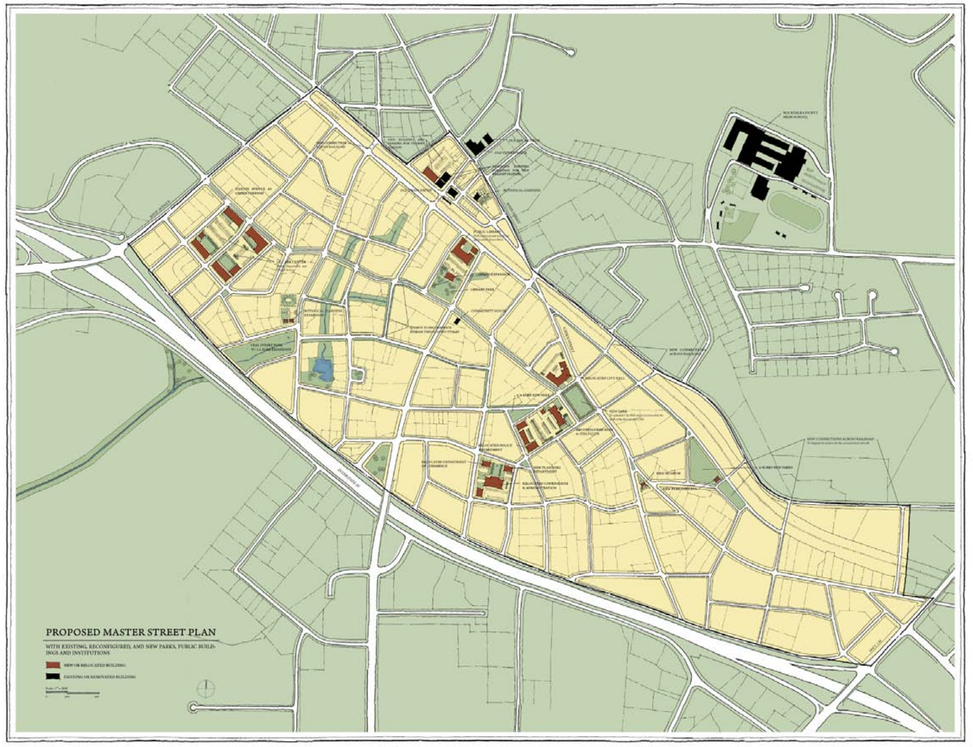
Suber, Peter. *The Paradox of Self-Amendment: A Study of Logic, Law, Omnipotence, and Change* (New York, NY: Peter Lang Publishing, Inc., 1990).

An explanation of why Conyers was chosen along with general history and information about the city.

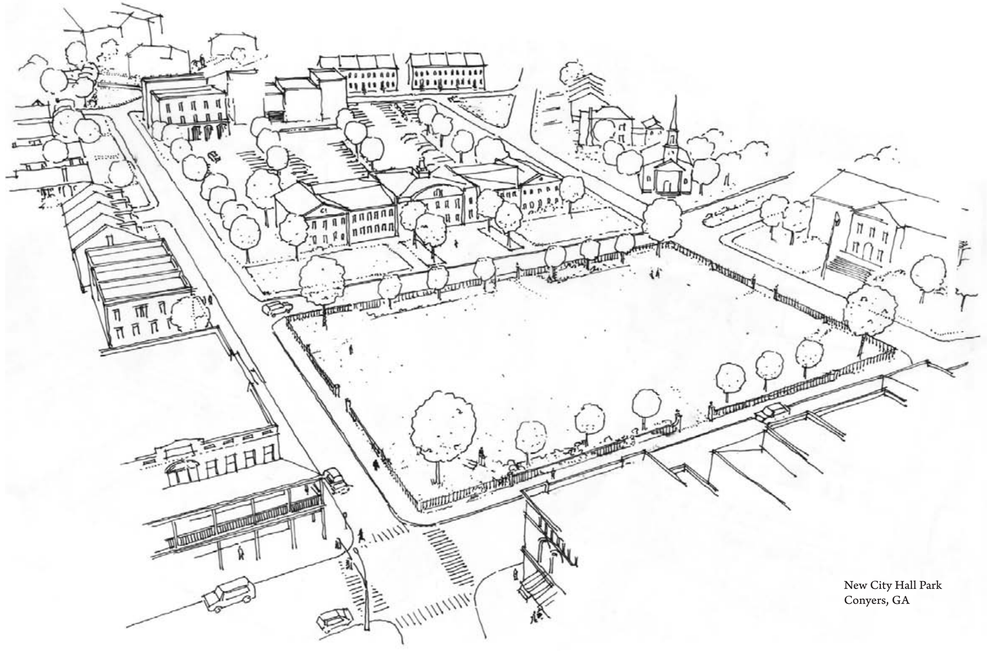




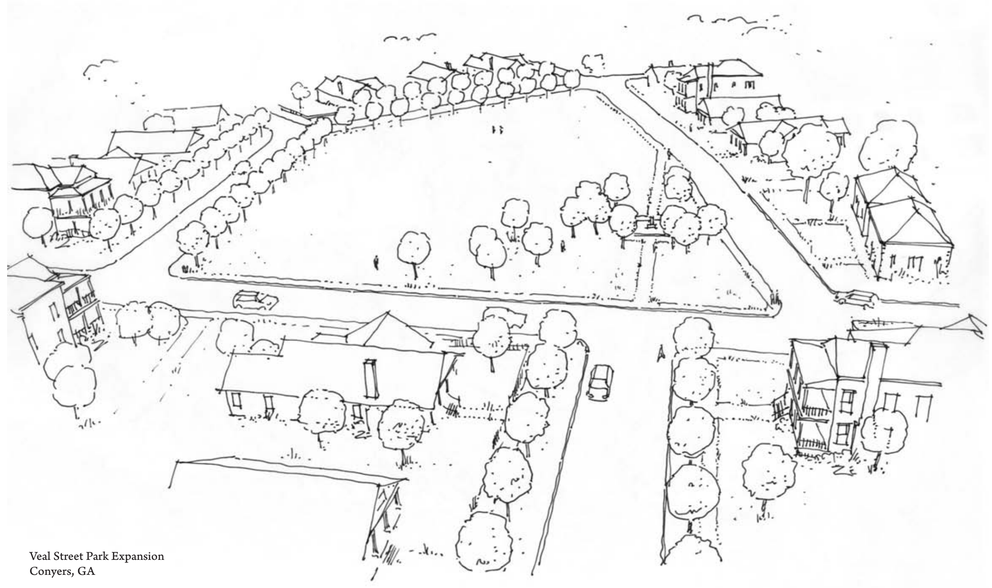
Existing street network of Conyer, GA.



Proposed street network of Conyer, GA.



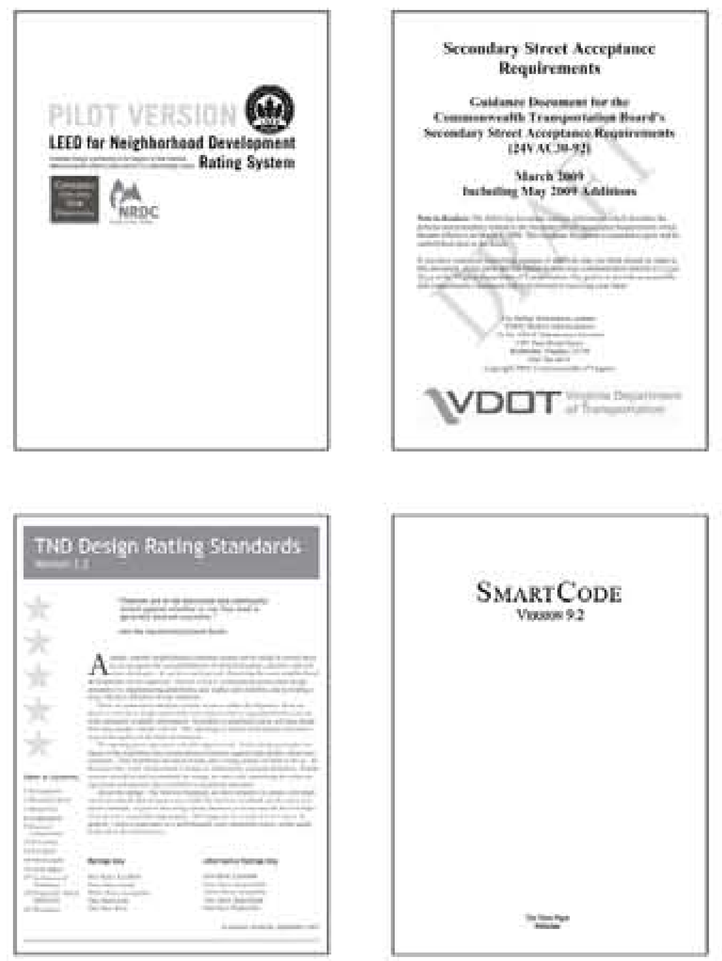
New City Hall Park
Conyers, GA



Veal Street Park Expansion
Conyers, GA

REGULATORY AUTOMATONS: An Analysis of Their Defective Machinery

SOURCES OF URBAN DESIGN METRICS



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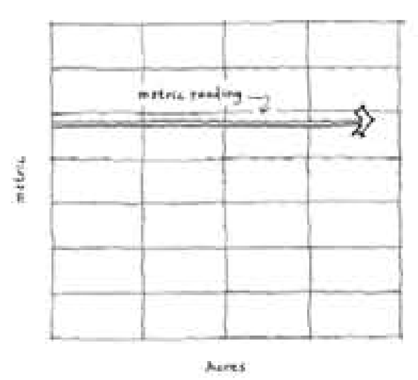
INITIAL EMPIRICAL OBSERVATION

An initial empirical observation was made while studying the street network of Savannah, Georgia. Beginning with a large 218 acre area, the *Intersection Density* and the *Connectivity Index (VDoT)* was calculated. Following that and considering that Savannah is simply composed of repeating wards, a smaller ward area of 12.4 acres was studied for comparison. Suprisingly, none of the metrics for each area matched or were even cloes to matching. In fact, for the *Connectivity Index* it went from a reading of "urban" to almost one of "rural". This was a strong hint at the faulty mechanics built-in to these metrics.

	218 Acre Area	*14 Acre Area*
Intersections / mi²	**686**	**1,030**
Connectivity Index	**1.64 (Urban)**	**1.40 (Suburban)**

THEORETICAL OBSERVATIONS



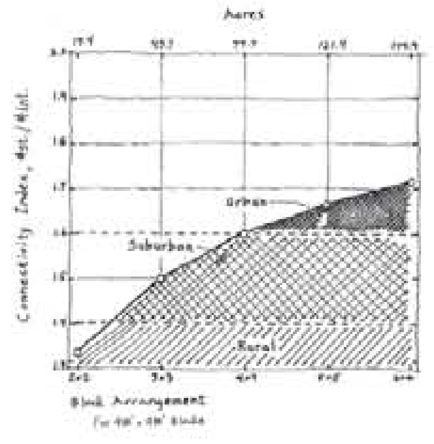
The intention behind each urban design metric is to produce a desired result consistently. The graph of such an intention would look like a simple horizontal line relative to the size of a project area (generally 15 acres to 200 acres as stipulated by many of the metrics). For example, if a metric calls for 220 intersections / mi², then that average should hold constant for all project areas. This is analogous to saying that gold is valued at $1,000 per ounce regardless of how many ounces of gold one has.

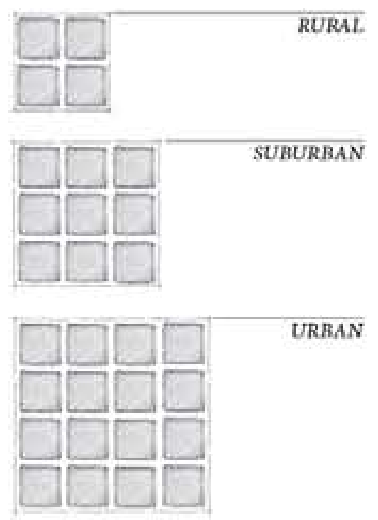
This seems to be a completely logical assumption, but the reality of the situation proves otherwise. By graphing the changes in a metric's value as one explores difference land areas, the line is anything but horizontal or constant.

Below are some findings on the ineffectiveness of both the *Connectivity Index* and *Intersection Density* which fail to control for any desired outcome. The exact same street network of 400 foot blocks is "read" differently based on simple changes in the study area.

CONNECTIVITY INDEX

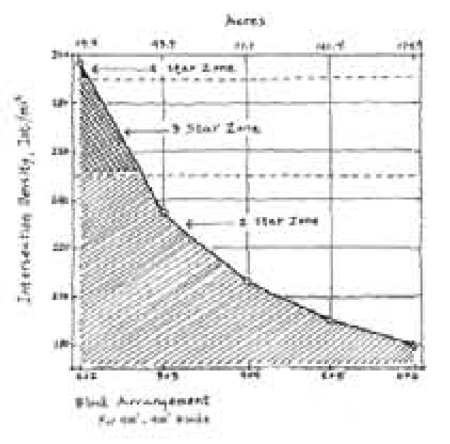
Virgina Department of Transportation Requirements

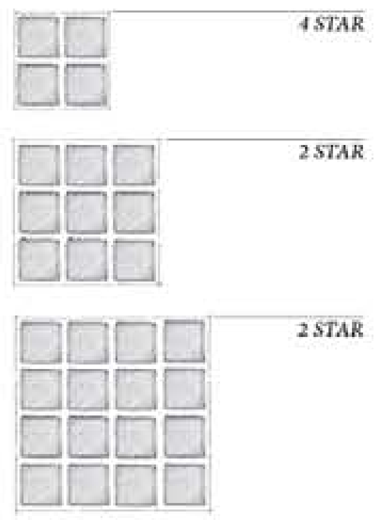




INTERSECTION DENSITY

TND Design Rating Standards on a 5 Star Scale





BEYOND METRICS

DESIGNING THE MASTER STREET PLAN

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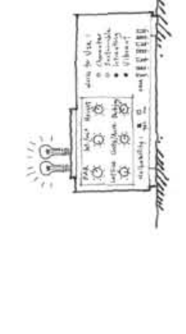
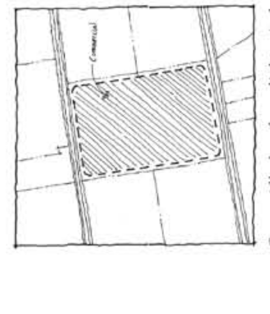
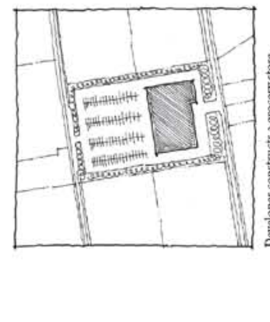


CURRENT DEVELOPMENT METHODOLOGY : Infrastructure Conforms to Land Use

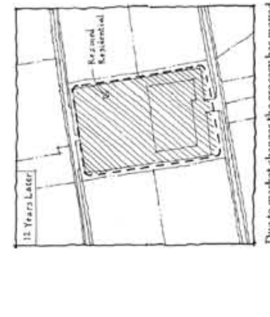
Currently, "zones of use" come first which in effect determine the geometry of a city's infrastructure. In this scenario, when a grocery store, for example, goes out of the business or simply changes its location the city is left with a building shell on a site that can only accommodate another grocery, a bowling alley, an antiques market, or other similarly large and unique uses. In order to reoccupy the land one of three things must happen: 1) a developer inhabits the parcel with a similar use, 2) a developer must reconfigure the parcel's infrastructure to accommodate a different use adding considerable cost to the project, or 3) the parcel simply remains vacant. All too often the latter case is found to be the answer while new developments continue to march into the hinterlands of our cities; thus, the perpetuation of sprawl.



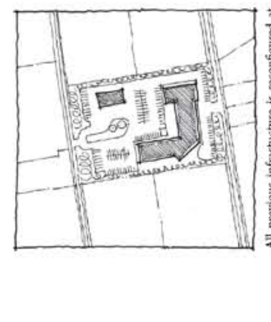
Commercial land use of a parcel is determined.



Developer constructs a grocery store.



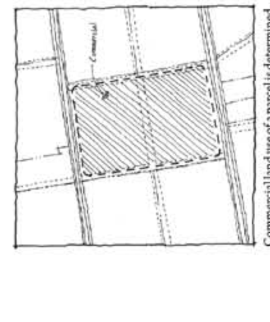
Due to market changes the grocery has moved to anther location. The parcel is rezoned for residential use.



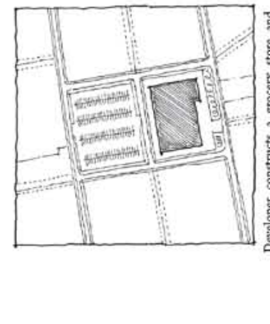
All previous infrastructure is reconfigured at great expense in order to accommodate the new use. This cycle will continue indefinitely.

PROPOSED DEVELOPMENT METHODOLOGY : Land Use Conforms to Infrastructure

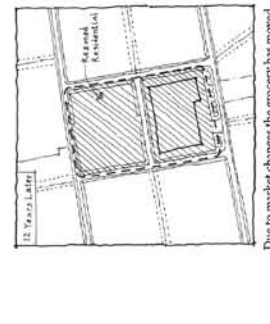
The pre-establishment of a master street plan, on the other hand, puts the geometry of infrastructure first and zones of use second. In this scenario of reversed roles, if and when the grocery store leaves, the infrastructure does not have to be fully reconfigured and is already apt to take on any use—from small residential to large commercial.



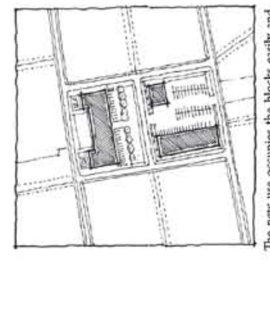
Commercial land use of a parcel is determined.



Developer constructs a grocery store and shares in the development of the reserved streets with the municipality.



Due to market changes the grocery has moved to anther location. The blocks are rezoned for residential use.



The new use occupies the blocks easily and efficiently without reconfiguring the streets. This cycle will continue indefinitely.

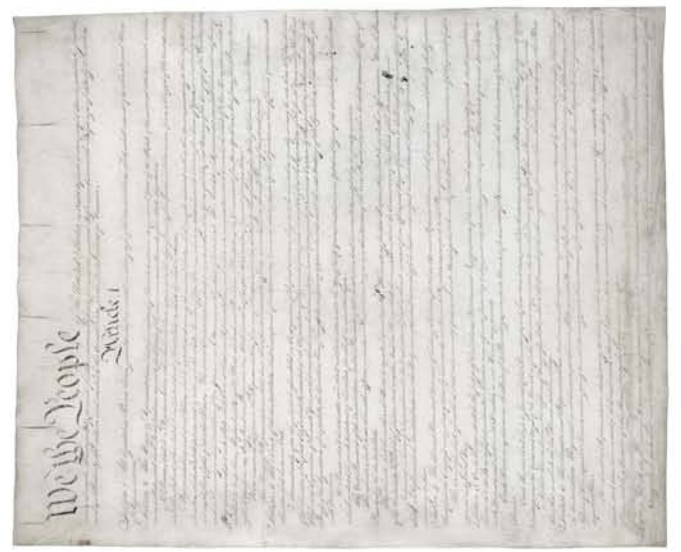
The Master Street Plan...

...is like the U.S. Constitution: rigid enough to keep everyone in line but flexible enough to accommodate the future we cannot predict.

...is a medium for the sustainable transfer of land uses over time allowing for the location of our infrastructure, utilities, and largest public space (our streets) to remain constant.

...is necessary to tie all regulatory metrics together and to keep them from acting autonomously.

...is dependent on the design intuitions of true professionals and cannot be mechanically regulated into a meaningful existence.

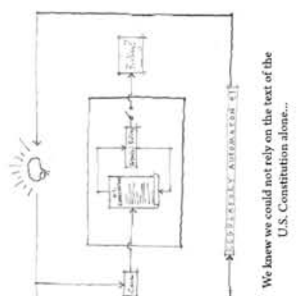


Our current development laws are missing the first and most critical step toward successful urban design and city planning: the pre-established physical framework of our towns and cities, or the Master Street Plan. Without the establishment of a master street plan, any and all attempts at urban design and city planning—be it through zoning, zoning overlays, New Urbanism, Character Areas, transfer of development rights, etc—will inevitably fail to fulfill the goal of a truly comprehensive, holistic, and sustainable city plan. The conceptual framework that successful city development requires cannot be found in various individual metrics. The master street plan must be present in order to tie all regulatory metrics together and to keep them from acting destructively and autonomously.

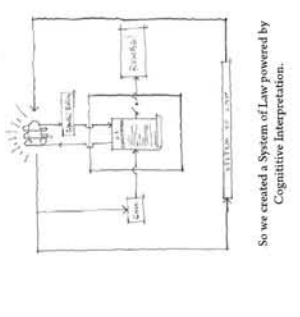
The master street plan says nothing about how a city should look or how it should feel. It is merely an indexical framework of the land. This index allows for action at a distance. For example, a suburban house built 5 miles from the city center will immediately fit within the greater physical framework of the area even if the full extent of the framework will not be physically realized for hundreds of years. As development continues out (and it will), the infrastructure need not change. Thus, the master street plan is a medium for the sustainable transfer of land uses over time allowing for the location of our infrastructure, utilities, and largest public space to remain constant.

The master street plan has no potential energy unto itself; rather, it requires our outside influence to realize its potential—just like the United States Constitution. Because the Constitution does not say everything we have an established court system of professional lawyers who interpret the Constitution. Because of this built-in "meta-Constitution", flexibility is readily observed as the same document that has allowed for slavery has also disallowed for slavery. The same text allowed for women's suffrage and disallowed for women's suffrage. Likewise, the master street plan requires this same level of professionalism and interpretation.

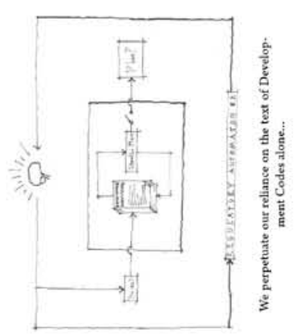
Every municipality has the legal authority to describe, adopt, empower, and follow a master street plan. Such power is described in the *Standard City Planning Enabling Act* of 1928. The act, intended to function as the primary vehicle for all future development of America's municipalities, was overwhelmed by its own subordinate: the *Standard State Zoning Enabling Act*. The stipulations within the *Zoning Act* concerning the "master plan" were conflated with those within the Enabling Act concerning the "master street plan." But given our benefit of history and hindsight, we have the opportunity to correct those mistakes made before us and to follow the original and true intentions of urban design as described in the *Enabling Act*. The master street plan, therefore, needs to assume its proper role at the forefront of development.



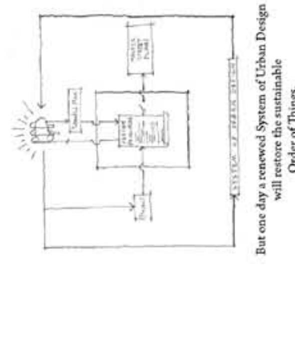
We knew we could not rely on the text of the U.S. Constitution alone...



So we created a System of Law powered by Cognitive Interpretation.



We perpetuate our reliance on the text of Development Codes alone...



But one day a renewed System of Urban Design will restore the sustainable Order of Things.

PROJECT ANALYSIS: Utilization of the Principles

EXISTING CONDITION

PROPOSED CONDITION

BLOCK SIZE

A block should have sides with lengths greater than 240 feet and less than 600 feet and should have a perimeter less than 2,000 feet. These dimensions create the physical permeability necessary for a sustainable, effecient, and vibrant urbanism to materialize.

Average block size:

Existing:	**618' x 1,052'**
Standard Deviation:	317' x 619'
Proposed:	**305' x 443'**
Standard Deviation:	93' x 111'

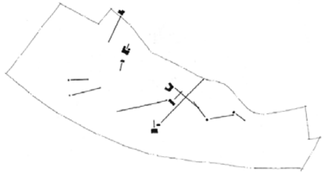
Number of Blocks:

Existing:	**18**
Proposed:	**68**

AXIAL LINES

Utilize axial lines to highlight important spaces and institutions, to close vistas, and to create a unique sense of enclosure.

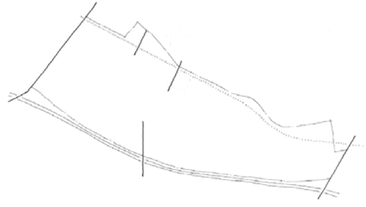
Center Street, the best street in Conyers, is a good start for the city, but there are many opportunities to celebrate more of its instutions as can be seen in the opposite diagram.



AUTONOMOUS SYSTEMS

Autonomous systems such as railroads, rivers, and interstate highways operate outside of the stipulations of local conditions. These systems should be traversed by local public rights-of-way as frequently as possible.

In order to reinforce downtown Conyers, the CSX rail line will have to be traversed more often than it is now.
The bridges over I-20 occur at approximately 3/4-mile intervals. Though more connections over it would be better, the best appropriation of funds would be to invest in new internal local streets as per the Master Street Plan.



PROJECT ANALYSIS: Utilization of the Principles

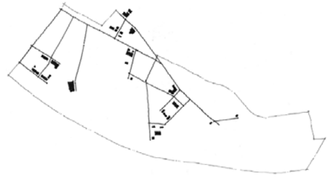
EXISTING CONDITION

PROPOSED CONDITION

PUBLIC INSTITUTIONS

Public institutions should occupy the most prominent, visible, and integrated parcels within the Master Street Plan. Avoid clustering these instutions into "office parks." Instead, allow them to anchor axial lines, reinforce parks, and front major streets.

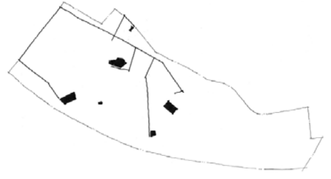
Note: the streets drawn are the most integrated streets (see Space Syntax sheet) that access and link all of the public institutions shown together.

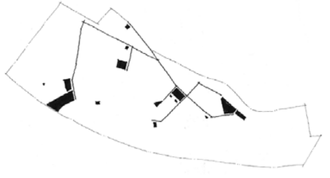


PARKS

A system of parks should be situated throughout the Plan in order to protect any existing sources of water and to insure adequate spaces of recreation. Parks can also be used to articulate important institutions, buildings, or monuments.

Note: the streets drawn are the most integrated streets (see Space Syntax sheet) that access and link all of the parks shown together.

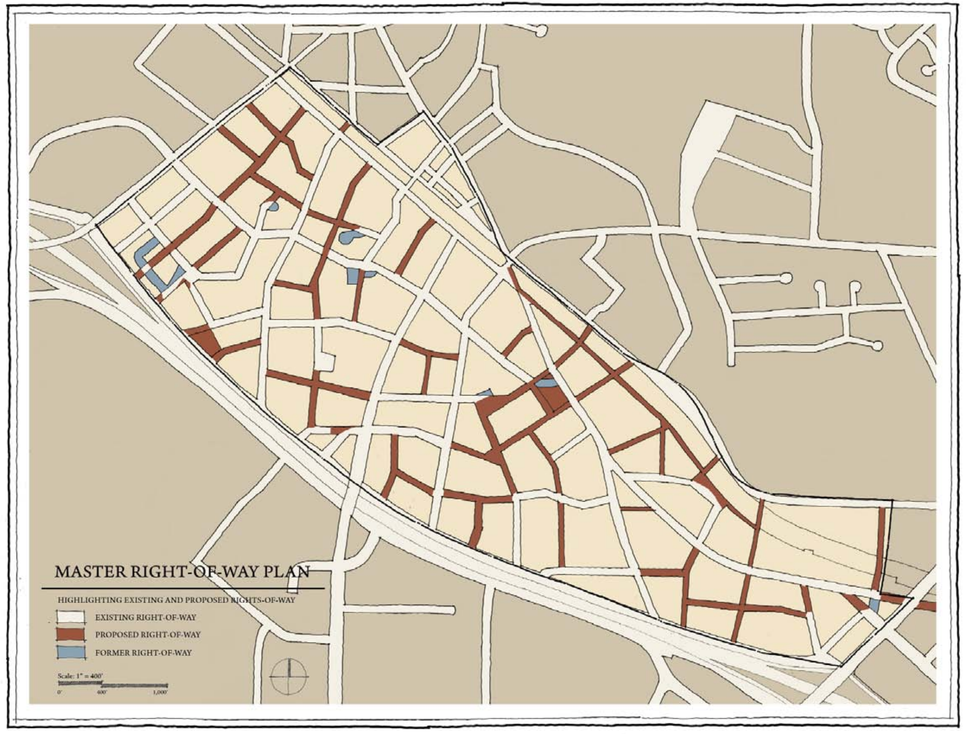


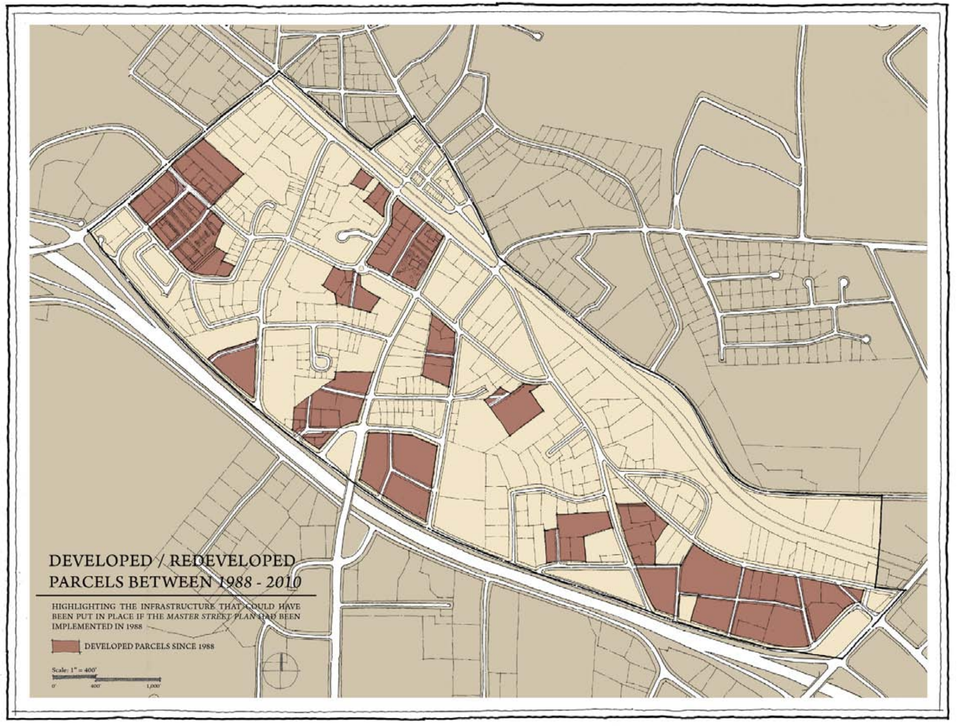


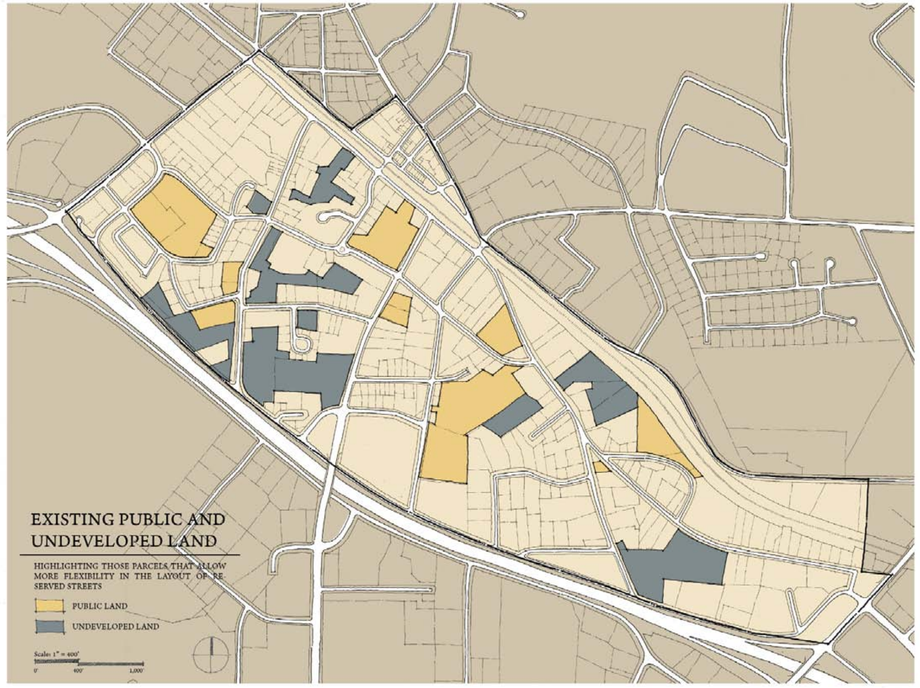
WATER

Streams and sources of water should be protected and accessable by public rights-of-way on all sides.
Common "backyard-buffer" conditions should be avoided when possible.
Where a stream would have a negative impact on the sustainability of the Street Plan it should be piped, rerouted, or incorporated into the street section in order to avoid such conflict.

The proposal is a compromise between all the components of the Principle: some of the stream is accessible, some remains in "backyard conditions," while most of the stream has been incorporated into the street section with bioswales.


MASTER RIGHT-OF-WAY PLAN
HIGHLIGHTING EXISTING AND PROPOSED RIGHTS-OF-WAY
EXISTING RIGHT-OF-WAY
PROPOSED RIGHT-OF-WAY
FORMER RIGHT-OF-WAY
Scale: 1" = 400'
0'
400'
1,000'


DEVELOPED / REDEVELOPED
PARCELS BETWEEN 1988 - 2010
HIGHLIGHTING THE INFRASTRUCTURE THAT COULD HAVE
BEEN PUT IN PLACE IF THE MASTER STREET PLAN HAD BEEN
IMPLEMENTED IN 1988
DEVELOPED PARCELS SINCE 1988
Scale: 1" = 400'
0'
400'
1,000'



PROJECT COSTS AND REALIZATIONS

The design of a Master Street Plan within a context of existing development should attempt to be as least invasive as possible even if this means not producing the "best" Plan. This can be done by sequentially working through each of the following design steps until an appropriate plan has been generated.

1 : Keep existing streets.
2 : Reconfigure publicly owned land.
3 : Designate reserved rights-of-way across undeveloped land.
4 : Designate reserved rights-of-way along property lines.
5 : Designate reserved rights-of-way across parcels.

INCREMENTAL COSTS: An Illustrative Example

1. Existing Conditions

Assume that the Master Street Plan calls for a right-of-way along the shared property line between the 3 parcels.

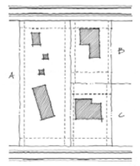
Parcel A: 130 feet x 400 feet
33,250 sf buildable area

Parcel B,C: 130 feet x 200 feet
14,700 sf buildable area

Front setbacks: 25 feet

Rear setbacks: 35 feet

Side setbacks: 10-20 feet



2. Reserve R.O.W. and Reconfigure Setbacks

1. Locate reserved right-of-way. In this case a 50 foot reserved R.O.W. was drawn by offsetting a 25 foot line from the shared parcel boundary thereby sharing the obligation among the parcel owners.

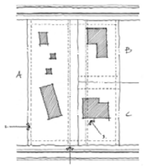
2. Reconfigure setbacks so property owners have the exact same (or more) buildable area as before the reconfiguration.

3. This non-conforming structure can remain until the owner substantially renovates or demolishes the building. Any new structure will have to comform to the new setback lines.

Changes to buildable area for each parcel include:

Parcel A: 33,300 sf buildable area (+50 sf)

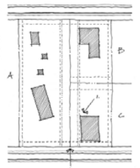
Parcel B,C: 14,850 sf buildable area (+150 ft)



3. Anticipate Clearing of Reserved R.O.W.

1. New building conforms to new set-back line.

2. Reserved R.O.W. is now clear. Eminent domain can now be excercised on that portion of property within the reservation lines.



4. Municipality Constructs New Street

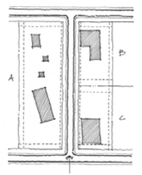
1. Condemn property and construct new street.

Costs for new 400 foot street:

Land Purchase:
•0.32 acres @ $90,000 / acre
$28,800

Street Construction:
•$275 - $341 / lineal foot
$110,000 - $136,400

Total Cost for New Street:
$138,800 - $165,200



TOTAL PROJECT COSTS

CONSTRUCTION COSTS

Assumptions:

•$275 - $341 / lineal foot for street construction

Project Proposal:

30,200 lineal feet of new streets

Total Construction Cost: $8,300,000 - $10,300,000

LAND SALES / PURCHASES

Assumptions:

•Average Land Value - $90,000 / acre
•Average R.O.W. width - 60 feet

Purchases:

2.3 acres of new parks	$207,000
41.6 acres of new R.O.W.	$3,744,000

Sales:

1.7 acres R.O.W.	-$153,000
Total Land Purchases:	**$3,798,000**

TOTAL COST: $12.1 - 14.1 million

Assumptions:

•This is not an upfront cost by any means. Complete build-out will take decades.
•Much if not all of the cost will be offset by an increase in property values and tax base over time.

An analysis of the before/after street network using Depthmap software by Space Syntax Ltd.